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ABSTRACT

This paper explores the Colorectal Cancer research scholarly communications published by Indian researchers based on the data available in web of science database for the period of 12 years (2005- 2016); using tools like WoS, MS Excel & Histcite. The analysis revealed that there is an increasing trend in total CRC research publications and majority of the publications are in the form of articles both in case of India and world. Total citations and average citation per paper in case of India also shows increasing trend except in 2009 and 2012. Increasing trend could also be observed in case of international collaborative works between India and rest of the world. India's highest collaborating country is USA 15.6% of the total collaborative works undertaken. The country wise distribution and year wise contributions shows that 50% of world CRC research comes from three countries viz. USA, China and Japan. In terms of funding CRC research work "Council of Scientific & Industrial Research" (CSIR) tops the list with (133) funding's as per the records. Sanyal SN is the most productive author contributing (2.2%) of articles. Authorship pattern shows that 10 and more than 10 authors contributed more papers. Panjab University has the maximum number of publications with 62 records having a Total Local Citation Score 80 and Total Global Citation Score 551. Highest subject wise distribution is Oncology with 386 papers and 31.56% share. Tumor biology is the most preferred journal with (47) 3.9% of the total periodical literature output during the period under study. Most common keywords used by the researchers in their publications are the word "Cancer" with 564 records, followed by the word "Colorectal" with 287 records. Jemal A, 2011, CA-CANCER J CLIN, V61, P69 is the top most cited papers as it has been cited 55 times.

Keywords: Scientometrics, Colorectal Cancer, Rectal Cancer, Oncology, India, Cancer, CRC

1. Introduction:

Cancer still continues to be the reason behind the death of millions of people across the globe and as per WHO incidence of death is still expected to rise. Out of more than 200 types of cancer, colorectal cancer is regarded as the third most common among the men and second among the women (Bhawna, 2014). As per American cancer society facts and figures, an estimated death of 50,260 is expected to occur due to CRC in 2017 (Society, 2017). In case of India as per Rajiv Gandhi Cancer research institute, CRC is the 6^{th} most prevalent cancer in India.

Various government organization and agencies around the world like WHO, American cancer Society, ICMR etc. has been taking various initiatives to impart right knowledge and message regarding this dreaded diseases and cure like for example in US, "National Library of Medicine" (NLM), with collection of more than seven million resources and related to medicine, including some of the world's oldest and rarest works has been a center of information innovation since its founding in 1836. In case of India various government organization like ICMR, DBT, Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy known as (AYUSH) etc. are taking several initiatives by supporting and promoting various biomedical research in India in different arears for various diseases for promoting sound health to the people. Such organizations might have also sponsored topics like research on colorectal cancer research under such circumstances it is important for us to know and evaluate the research output and its productivity, authors productivity etc. for future CRC research strategy. To evaluate the research output and productivity scientometrics analysis is generally adopted (Leydesdorff & Milojević, 2012).

Scientometrics is defined as "the application of quantitative methods which deals with the analysis of science viewed as an information process"(Nalimov & Mul'chenko, 1989). It is interdisciplinary in nature typically used to measure scientific publications indexed in databases. The application of scientometric study helps in evaluating the research output, author productivity of various countries, universities, research institutes, journals, specific research topics and specific disciplines.

Previous studies show that using scientometrics quite a few researchers have already explored the cancer research scholarly communications (Lewison & Roe, 2012; Patra & Bhattacharya, 2005). By applying various methods like Bradford's Law, Lotka's Law in order to identify the core journals core journals and author productivity in oncology research. They analyzed research activities and trends in such activities for different countries and India. In line with this again, other researchers elucidated the research output in the field of oncology by Indians in Canada and USA (Basu, Roe, & Lewison, 2012). Focusing on various aspects such as literature growth research quality, international collaboration, research output by geographical regions, types of research, output by cancer site or manifestation and sources of funding for research etc. even the literature on anemia disease were explored by (Vellaichamy & Jeyshankar, 2014) by taking

Scopus database for the period of 1993–2013; focusing on various aspects like authorship pattern, degree of collaboration, most productive authors, subject pattern, major collaborative partners in India, most productive journals, active institutions and highly cited papers.

Similarly, Indian publications in the field of lymphoma cancer, cervical cancer, prostate cancer, gall bladder cancer, lung cancer and breast cancer were analyzed (B. M. Gupta & Gupta, 2015; R. Gupta, Ahmed, Gupta, & Bansal, 2016; R. Gupta, Ahmed, Gupta, & Garg, 2016; R. Gupta, Gupta, Ahmed, & Tiwari, 2014; R. Gupta & Gupta, 2014; Singh, Handa, Kumar, & Singh, 2016); focusing on various aspects like literature growth in such area, research impact, share of international collaborative publications, publication output by geographical areas, type of research adopted etc. Exploring different aspects of scientific literature using different database. Even CRC research output were examined by Gupta et.al (R. Gupta, Gupta, Ahmed, & others, 2016) using Scopus database for a period of 2005- 2014. 3042 Indian publications in colorectal cancer were considered to evaluate the publication output.

Scientometrics were even used in other disciplines like (Murugan, C., & Balasubramani, R., 2012) conducted a quantitative analysis of remote sensing, in terms of research output throughout the world during 1975- FEB 2010; focus on various aspects of the journals such as number of papers, year- wise publications, cited references, most productive authors, authorship pattern, forms of document cited, most preferred journal, country wise publications and the most preferred language by scientist etc. (Balasubramani, R., & Murugan, C., 2011) studied Sago research in India analyzing and comparing the number of document, journals and international collaboration from the period of 1973- 2010; using Histcite Software application. Scientometrics were not only used to measure research output of particular research discipline but are even used to measure journal output like for example (Narzary, R., & Murugan, C., 2017) analyzed the publications in ETRI Journal exploring various methods such as document type, year wise distribution, authorship pattern, authors productivity, institutions, relative growth rate, doubling time, exponential growth rate, average authors per paper, degree of collaboration etc.

The literature searches reveals that there is already a study related to CRC research output but the authors have used Scopus database to analyze the scientific research output in CRC; as there is no study yet using web of science database (WoS), Hence CRC research output available in web of science database using scientometrics approach is explored. “Scopus and WoS, though complementary, are very different tools in terms of their coverage/scope and methods”[1]. “Both tools use bibliometrics but has different features, coverage and practices to arrive at citation counts and impact. Scopus has more content (~18-22,000 journals) but has an obvious bias in its coverage of European journals Elsevier titles. WoS covers about ~12,000 journals (open access titles and conference abstracts) but reveals its own American bias”.

2. Objectives

[1] Scopus vs. Web of Science. (2017, June 25). *HLWIKI Canada*, Retrieved 04:23, August 31, 2017 from http://hlwiki.slais.ubc.ca/index.php?title=Scopus_vs._Web_of_Science&oldid=147389

The following are the objectives of the present study

- To study the document-wise publications productivity
- To identify Year wise growth in CRC literature and international collaborative papers during 2005- 2016
- To find out the top Funding agencies for CRC research in India
- To identify the most prolific authors in the field of CRC research in India
- To find out degree of collaboration on publications output
- To study the institution wise distribution of publications
- To identify the core journals which publish the articles related to CRC research
- To identify the most common key word used while publication

3. Materials and Methods:

The data required for this study is retrieved and downloaded from web of science core collection database maintained by Thomson Reuters. The period of study is 12 years (2005- 2016). Using basic search strategy i.e. key word "Colorectal Cancer" as a topic; time span from 2005-2016; citation index as "Science Citation Index Expanded (SCI-EXPANDED)–1989" present using three different field together (Topic, author and publication name). A record of 1,16,588 covering various document types was shown then refined the records using country/ territory. The selected country as 'India' resulting in search result of 1219 records, related to Colorectal Cancer disease. All the bibliographic details using EndNote were exported using RIS format for further analysis. WoS, MS Excel, Histcite software package were used in order to analyze the collected data.

4. Analysis and Interpretation: The data collected has been analyzed and interpreted under following heads:

4.1 Document wise distribution of publications: World publication record of 1,16,588 and 1219 CRC literature in case of India were analyzed to publication and divided to various document types like: Article, Review, Meeting abstract, Editorial material, Letter, Proceedings paper, Correction, Book chapter, News item, Retracted publication, Reprint, Retraction, Data paper and Biographical item. Table No.1 shows publications of both world and India. The results reveals that majority of publications are in the form of articles (82702) and 952 (78.1%) in case of India, followed by; (12479), 174 (14.3%) of papers in review; (15380), 59 (4.8%) of papers published in Meeting Abstract; (3342), 17 (1.4%) of papers in Editorial Material; (2018), 13 (1.1%) of papers are published in Letter and (2619), 4 (0.3%) Proceedings. The record of different types of documents like Correction, Book chapter, News item, Retracted publication, Reprint, Retraction, Data paper and Biographical items were not found in case of India.

Table No.1: Document-Wise distribution of Publications

Sl. No	Document Type	World	India			
			TP	%	TLCS	TGCS
1	Article	82707	952	78.1	535	14245
2	Review	12479	174	14.3	56	3250
3	Meeting abstract	15380	59	4.8	0	6
4	Editorial material	3342	17	1.4	0	25
5	Letter	2018	13	1.1	4	18
6	Proceedings paper	2619	4	0.3	1	86
7	Correction	380	----	----	----	----
8	Book chapter	298	----	----	----	----
9	News item	260	----	----	----	----
10	Retracted publication	68	----	----	----	----
11	Reprint	12	----	----	----	----
12	Retraction	5	----	----	----	----
13	Data paper	3	----	----	----	----
14	Biographical item	2	----	----	----	----
	Total	**116588**	**1219**	**100**	**596**	**17630**

***TP**: "Total Publication"; **TLC**: "Total Local Citation"; **TGCS**: "Total Global Citation Score"*

4.2 Year wise distribution of India and world CRC total publications: Year wise publication and international collaborative publications between world and India were identified in order to know and understand the trend in CRC literature. The table no.2 below depicts that since 2005, there is an increase in total publications both for the world (5623) 5.52% in 2005 to (14318) 14% 2016. In India, 14 total publications were found in 2005 which has increasing trend from1.1% to 19.4% (237) in 2016. Total citations and average citation per paper in case of India also shows increasing trend except in 2009 and 2012. Increasing trend could also be observed in case of international collaboration papers between India and rest of the world, in 2005 only 2 collaborative papers were found in WoS database it has increased to 87 in 2016. India's share in global CRC literature which is also increased from 0.25% to 1.66%

Table No.2: Year wise growth CRC literature and International collaboration

Year of publication	World	India						
	TP	TP	% of TP	TC	ACPP	ICP	% of ICP	Share in world output
2005	5623	14	1.1	153	10.93	2	14.29	0.25
2006	6168	29	2.4	552	19.03	9	31.03	0.47
2007	6809	23	1.9	559	24.30	8	34.78	0.34

2008	7785	59	4.8	1543	26.15	18	30.51	0.76
2009	8214	48	3.9	719	14.98	10	20.83	0.58
2010	9134	89	7.3	1775	19.94	18	20.22	0.97
2011	9743	96	7.9	1773	18.47	30	31.25	0.99
2012	11061	119	9.8	1425	11.88	21	17.50	1.08
2013	11648	149	12.2	2412	16.19	40	26.85	1.28
2014	12535	177	14.5	1735	9.80	51	28.81	1.41
2015	13550	180	14.8	4534	24.91	78	42.86	1.34
2016	14318	236	19.4	482	2.03	87	36.71	1.66
Total	**116588**	**1219**	**100**	**17662**	**14.44**	**372**	**30.42**	**1.05**

TP: "*Total Publication"; **TC**: "Total Citation"; **ACPP**: "Average Citation Per Publication"; **ICP**: "International Collaborative Papers".*

4.3 Country wise contribution: Table No.3 shows the top 15 contributors in CRC research globally. 50% of the contribution of CRC research literatures comes from three countries viz. USA, China and Japan and rest followed by other countries like England, Germany, Italy France etc. Among the 15 countries there is an increasing trend in CRC total publications during the period from 2005 to 2016.

Table No.3: Top 15 countries in CRC publications

Countries	Records	%	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
USA	35069	30.08	2000	2128	2206	2523	2690	2870	3019	3159	3491	3595	3770	3618
PRC	14189	12.17	176	221	301	364	472	686	869	1281	1689	2273	2674	3183
Japan	9643	8.27	583	626	672	642	715	721	812	854	873	983	1087	1075
England	8860	7.60	481	500	602	645	622	773	758	849	859	881	1006	884
Germany	8483	7.28	509	515	592	658	643	765	743	770	754	826	859	849
Italy	7825	6.71	361	450	498	569	587	610	606	708	816	816	909	895
France	5788	4.96	323	337	381	465	431	503	533	555	567	553	564	576
Canada	4710	4.04	220	239	285	363	367	386	418	442	498	482	493	517
Netherlands	4685	4.02	231	223	287	365	351	375	424	446	488	482	528	485
South Korea	4597	3.94	112	137	206	233	309	365	430	480	504	535	634	652
Spain	4285	3.68	200	205	240	278	286	358	373	490	424	459	489	483
Australia	4199	3.60	131	206	238	287	295	321	360	419	484	478	473	507
Taiwan	2212	1.90	83	96	83	104	129	146	205	232	250	277	317	290
Sweden	2208	1.89	135	121	138	139	150	167	192	237	230	224	229	246
Switzerland	1961	1.68	234	224	207	200	177	175	156	149	148	110	95	86

4.4 International collaboration: Most of the advanced research around the globe are being carried out in collaboration to overcome various issues like limited skill and expertise etc. where different group with unmeasured level of knowledge join hands to carry out the research work. The results from table no.4, below reveals that highest collaborating country in CRC research with India is USA where in 15.6% out of the total collaborative work undertaken, next 2nd highest collaboration is between India and UK i.e.5.6% and third comes India and Australia at 4.1% followed by other countries like South Korea, P R C, Germany, Italy, Japan, Saudi Arabia, Malaysia, Canada, France, Singapore and Belgium.

Table No.4: India's collaboration with other countries (Top 15 countries)

Sl. No	Country	Records	%	TLCS	TGCS
1	India	1210	99.3	593	17588
2	USA	190	15.6	56	4371
3	UK	68	5.6	21	5334
4	Australia	50	4.1	12	2072
5	South Korea	43	3.5	10	1312
6	Peoples R China	41	3.4	19	1932
7	Germany	35	2.9	6	1709
8	Italy	31	2.5	3	1711
9	Japan	30	2.5	24	1939
10	Saudi Arabia	29	2.4	3	303
11	Malaysia	24	2.0	12	597
12	Canada	21	1.7	0	1710
13	France	21	1.7	16	4883
14	Singapore	19	1.6	11	518
15	Belgium	14	1.1	3	728

4.5 Top Funding agencies in India: The table below shows the organizations which are involved in funding CRC research in India. It is observed that Council of Scientific & Industrial Research (CSIR), India, is the top finding agency in CRC research with total record of 133 funding activities. Department of Biotechnology, Government of India with 129 funding and third highest funding is shared between University Grants Commission and Indian Council of Medical Research (99) each.

Table No.5: Top 15 Funding agencies in colorectal cancer

Sl. No	Funding Agencies	No. of Fundings
1	CSIR	133
2	DBT	129
3	ICMR	99
4	UGC	99
5	DST	49
6	National Institute Of Health	21
7	Nci Nih Hhs	6
8	Sher-I-Kashmir Institute Of Medical Sciences Kashmir	6
9	Amgen Inc.	5
10	Centre For Molecular Medicine	4
11	Department Of Defense	4
12	Indo Uk Cancer Research Program	4
13	American Cancer Society	3
14	Centre For Industrial Consultancy And Sponsored Research Indian Institute Of Tec	3
15	Deutsche Forschungsgemeinschaft	3

4.6 Prolific authors: Table No.6 reveals the top 15 prolific authors. They have contributed a total of 261 papers. Among which Sanyal SN is the most productive author with 27 (2.2%) of articles, followed by Kumar A and Kumar R with 24 record (2.0%) articles each; Nalini N contributed 22 (1.85%) articles and Sameer AS with 20 articles.

Table No.6: Prolific authors wise distribution (Top 15)

Sl. No	Author	Records	%	TLCS	TGCS
1	Sanyal SN	27	2.2	58	283
2	Kumar A	24	2.0	16	312
3	Kumar R	24	2.0	2	162
4	Nalini N	22	1.8	27	278
5	Sameer AS	20	1.6	41	178
6	Mittal B	17	1.4	12	211
7	Sharma A	15	1.2	2	53
8	Sharma R	15	1.2	4	178
9	Vaish V	15	1.2	42	187
10	Gupta A	14	1.1	7	88
11	Gupta S	14	1.1	12	105
12	Sharma S	14	1.1	2	49
13	Siddiqi MA	14	1.1	30	169

14	Vaiphei K	14	1.1	10	90
15	Chowdri NA	12	1.0	14	66

4.7 Authors productivity pattern: Table No.7 indicates the year wise authorship pattern in the field of CRC research. Most of the papers published were collaborative work of four authors (188), followed by group of five authors (181), three authors (167), two author (136), six authors (124), 10+ authors papers (123), seven authors (109), eight authors (65), nine authors (58) and ten authors (44). The least number of papers are single author (24).

Table No.7: Year-wise Authorship Pattern

Year/ Authors	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**10+**	**Total**
2005	0	1	5	1	1	0	1	1	1	1	2	14
2006	0	3	3	2	3	6	2	3	0	5	2	29
2007	0	1	5	4	1	6	2	3	1	0	0	23
2008	4	10	9	7	9	7	2	1	2	5	3	59
2009	1	2	9	14	7	4	2	3	2	2	2	48
2010	2	13	16	11	12	10	14	4	0	1	6	89
2011	3	19	9	16	14	8	11	2	2	4	8	96
2012	3	19	15	23	13	10	15	7	3	3	8	119
2013	3	17	19	32	19	13	9	8	7	5	17	149
2014	2	14	25	25	34	20	10	8	12	6	21	177
2015	3	16	18	19	30	20	18	8	16	6	26	180
2016	3	21	34	34	38	20	23	17	12	6	28	236
Total	**24**	**136**	**167**	**188**	**181**	**124**	**109**	**65**	**58**	**44**	**123**	**1219**

Degree of collaboration is verified for knowing the strength of collaboration which is given below

Table No.8: Degree of Collaboration in Publications Output

Sl. No	**Year**	**NS**	**NM**	**NS + NM**	**DC**
1	2005	0	14	14	1.00
2	2006	0	29	29	1.00
3	2007	0	23	23	1.00
4	2008	4	55	59	0.93
5	2009	1	47	48	0.97
6	2010	2	87	89	0.97
7	2011	3	93	96	0.96
8	2012	3	116	119	0.97

9	2013	3	146	149	0.97
10	2014	2	175	177	0.98
11	2015	3	177	180	0.98
12	2016	3	233	236	0.98
	Total	**24**	**1195**	**1219**	**0.98**

$$C = \frac{NM}{NM+NS}$$

C= Degree of Collaboration; NM= No. of Multi authored papers; NS= No. of Single author papers.

In order to determine the strength of Collaboration (DC), formula suggested by (Subramanyam, 1983) has been employed. The degree of collaboration in different years calculated as per the equation is presented in table no. 8 and it showed that the degree of collaboration ranges from 1.00 to 0.98. The mean value is found to be 0.98.

Table No.9: Institution wise publication (top 15)

Sl. No	Institution	Records	%	TLCS	TGCS
1	Panjab University	62	5.1	80	551
2	AIMS	61	5.0	24	867
3	Tata Mem Hospital	57	4.7	24	3829
4	University of Kashmir	35	2.9	31	269
5	University of Madras	35	2.9	53	536
6	Sherikashmir Inst Med Sci	34	2.8	51	285
7	Annamalai University	32	2.6	32	450
8	CSIR	21	1.7	3	146
9	Postgrad Inst Med Educ & Res	21	1.7	12	169
10	Indian Inst Technol	20	1.6	5	169
11	Chittaranjan Natl Canc Inst	19	1.6	18	261
12	Manipal University	17	1.4	8	170
13	University of Delhi	17	1.4	14	185
14	Banaras Hindu University	15	1.2	3	105

15	Jawaharlal Nehru University	15	1.2	16	360

4.8 Institution wise distribution: Table No. 9 presents the contribution of top 15 institutions in Colorectal Cancer research output. Panjab University has the maximum number of publications with 62 records having a Local Citation Score of 80 and Global Citation Score of 551, followed by All India Institute of Medical Science with 61 publications, having a Local Citation Score of 24 and a Global Citation Score of 867, followed by Tata memorial Hospital with 57 records. It is also noted that institutes with minimum publications have scored highest Global Citation Score.

Table No. 10: Top 15 Subject- wise research output

Sl. No	Subject Areas	Record counts	Percentage share
1	Oncology	386	31.562 %
2	Pharmacology pharmacy	190	15.536 %
3	Biochemistry molecular biology	168	13.737 %
4	Cell biology	89	7.277 %
5	Chemistry	76	6.214 %
6	Science technology other topics	74	6.051 %
7	Gastroenterology hepatology	73	5.969 %
8	Surgery	72	5.887 %
9	Toxicology	59	4.824 %
10	Genetics heredity	56	4.579 %
11	Research experimental medicine	52	4.252 %
12	Biotechnology applied microbiology	49	4.007 %
13	Pathology	33	2.698 %
14	Immunology	32	2.617 %
15	Biophysics	28	2.289 %

4.9 Subject wise distribution of research output: Table No. 10 shows the India's subject wise publication output in colorectal cancer under various subject areas. The highest publications output came from field of Oncology with 386 papers and 31.56% share, followed by Pharmacology Pharmacy (with 190 and 15.53% share), Biochemistry Molecular Biology (168) 13.73%, Cell Biology (89) 7.27 %, Chemistry (76) 6.21 % respectively.

Table No.11: List of Most productive journals (top 15)

Sl. No	Journal	Records	%	TLCS	TGCS
1	Tumor Biology	47	3.9	39	354
2	Plos One	41	3.4	0	532
3	Asian Pacific Journal Of Cancer Prevention	27	2.2	17	196

4	Indian Journal Of Cancer	23	1.9	1	56
5	Indian Journal Of Surgery	21	1.7	2	23
6	Molecular Carcinogenesis	18	1.5	18	175
7	Annals Of Oncology	17	1.4	0	0
8	Journal Of Clinical Oncology	16	1.3	0	3
9	Molecular And Cellular Biochemistry	15	1.2	14	170
10	European Journal Of Cancer Prevention	12	1.0	16	128
11	Drug Delivery	10	0.8	6	75
12	Indian Journal Of Medical Research	10	0.8	5	51
13	Journal Of Gastroenterology And Hepatology	10	0.8	12	165
14	Nutrition And Cancer-An International Journal	10	0.8	9	82
15	World Journal Of Gastroenterology	10	0.8	5	92

4.10 Journal wise classification: Table No.11 shows the list of most preferred journals to publish their research papers. It is identified that the Tumor Biology is the most preferred journal with (47) 3.9% of the total periodical literature output available during the period. Second is PLOS One with (41) 3.4%; third by Asian Pacific Journal of Cancer Prevention (27) 2.2% and Indian Journal of Cancer fourth most preferred with 1.9% (23).

Table No.12: Key word wise distribution of publications (Top 15)

Sl. No	Word	Records	%	TLCS	TGCS
1	Cancer	564	46.3	306	9687
2	Colorectal	287	23.5	218	2704
3	Colon	202	16.6	178	2302
4	Cell	126	10.3	42	1738
5	Induced	110	9.0	139	1468
6	Cells	104	8.5	38	1194
7	Patients	98	8.0	30	805
8	Carcinoma	95	7.8	35	1047
9	Carcinogenesis	79	6.5	103	1082
10	Gene	76	6.2	36	695
11	Human	72	5.9	14	576
12	Indian	62	5.1	49	482
13	Expression	59	4.8	9	452
14	Analysis	56	4.6	15	430
15	Risk	56	4.6	63	593

4.11 Key word wise distribution: Table No. 12 presents the top 15 keywords used by the researchers in their publications. It is clearly seen from the table that the word "Cancer" has been used 564 times by the researchers with a Local Citation Score of 306 and a Global Citation Score of 9687, followed by the word "Colorectal" 287 times with a Local Citation Score of 218 and a Global Citation Score of 2704. And this is true to the case, as it supports the key word "colorectal cancer" for the present study.

Table No.13: Highly cited papers in colorectal cancer

Sl. No	Author/ Year/ Journal	Records	%
1	Jemal A, 2011, CA-CANCER J CLIN, V61, P69	55	4.5
2	Lowry OH, 1951, J BIOL CHEM, V193, P265	53	4.3
3	Parkin DM, 2005, CA-CANCER J CLIN, V55, P74	31	2.5
4	BRADFORD MM, 1976, ANAL BIOCHEM, V72, P248	29	2.4
5	Hanahan D, 2011, CELL, V144, P646	29	2.4
6	FEARON ER, 1990, CELL, V61, P759	27	2.2
7	Ferlay J, 2010, INT J CANCER, V127, P2893	27	2.2
8	Hurwitz H, 2004, NEW ENGL J MED, V350, P2335	25	2.1
9	MILLER SA, 1988, NUCLEIC ACIDS RES, V16, P1215	24	2.0
10	MOSMANN T, 1983, J IMMUNOL METHODS, V65, P55	23	1.9
11	OHKAWA H, 1979, ANAL BIOCHEM, V95, P351	22	1.8
12	BIRD RP, 1987, CANCER LETT, V37, P147	21	1.7
13	Bartel DP, 2004, CELL, V116, P281	21	1.7
14	HABIG WH, 1974, J BIOL CHEM, V249, P7130	21	1.7
15	Hanahan D, 2000, CELL, V100, P57	20	1.6

4.12 Highly cited papers in CRC research: The result reveals that Jemal A, 2011, CA-CANCER J CLIN, V61, P69 is the top most cited papers as it has been cited 55 times followed by Lowry Oh, 1951, J BIOL CHEM, V193, P265 with 53 records and Parkin DM, 2005, CA-CANCER J CLIN, V55, P74 with a records of 31 times.

5. Findings and conclusion:

The finding of the study reveals that most of the publications were in the form of articles 82702 (World) and 952 (78.1%) in case of India, followed by (12479), 174 (14.3%) of papers in review; (15380), 59 (4.8%) of papers published in Meeting Abstract; (3342), 17 (1.4%) of papers in

Editorial Material; (2018), 13 (1.1%) of papers are published in Letter and (2619), 4 (0.3%) Proceedings. Since 2005 till 2016, increasing trend in total publication could be seen globally (5623) in 2005 to (14318) 2016 and India 14 in 2005 to 237 in 2016. Total citations and average citation per paper in case of India also shows increasing trend except in 2009 and 2012. Increasing numbers could also be observed with regard to international collaboration papers between India and rest of the world. India's highest collaborating country is USA 15.6% out of the total collaborative work undertaken, next 2nd highest collaboration is India & UK 5.6% of collaborative works and third comes India & Australia 4.1%. 50% of the contribution in world CRC research came from three countries viz. USA, China and Japan. It is observed that Council of Scientific & Industrial Research (CSIR), is the premier in funding CRC research work 133 funding as per the records; Department of Biotechnology Government of India with 129 funding and third highest funding is shared between University Grants Commission and Indian Council of Medical Research (99) records. Top 15 most productive authors contributed 261 papers. Among them Sanyal SN is the most productive author contributing 27 (2.2%) of articles followed by Kumar A and Kumar R with 24 (2.0%) articles each; Nalini N contributed 22 (1.85%) articles and Sameer AS with 20 articles. Majority of the papers were published by four authors (188), followed by group of five authors (181), three authors (167), two author (136), six authors (124), above ten authors papers (123), seven authors (109), eight authors (65), nine authors (58) and ten authors (44) and single author with 24 records. Top 15 institutions published 461 papers related to CRC research. Out of which Punjab Univ. has the maximum number of publications with 62 records having a Local Citation Score 80 and Global Citation Score 551, followed by All India Inst Med Sci with 61 publications, having a Local Citation Score of 24 and a Global Citation Score of 867. It is also noted that institutes with minimum publications have scored highest Global Citation Score. Subject wise highest publications output came from the field of Oncology with 386 papers and 31.56% share, followed by Pharmacology Pharmacy (with 190 and 15.53% share), Biochemistry Molecular Biology (168 and 13.73% share), Cell Biology (89 and 7.27 % share), Chemistry (76 and 6.21 % share) respectively. Tumor Biology seems to be the most productive journal with (47) 3.9% of the total output during the period. Second is by PLOS ONE with (41) 3.4%, third by Asian Pacific Journal of Cancer Prevention (27) 2.2% and Indian Journal of Cancer is in fourth with (23) 1.9%. Rest of the journals less than 1.9% records. The word "Cancer" is the most common key word used by the researchers with 564 records, a Local Citation Score of 306 and a Global Citation Score of 9687, followed by the word "Colorectal" in 287 records with a Local Citation Score of 218 and a Global Citation Score of 2704. Jemal A, 2011, CA-CANCER J CLIN, V61, P69, is the top most cited papers as it has been cited 55 times followed by Lowry OH, 1951, J BIOL CHEM, V193, P265 with 53 records and Parkin DM, 2005, CA-CANCER J CLIN, V55, P74 with a record of 31 times.

It can be concluded that number of initiatives has been already taken by various organization and researchers to address the issue of CRC in India. As per the statistics CRC is the 6^{th} most prevalent disease in India but in terms of research publication output it comes to 24^{th} position globally. No literature was found related to Ayurveda treatment of CRC. So the Indian

researchers can focus towards the Ayurveda way of treating the CRC. More advanced research should also be carried out keeping in mind the Indian context as it is diverse in nature.

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